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CERMET FRICTION MATERIAL

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by

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Block	Italic	Transliteration	Block	Italic	Transliteration
А а	*А а*	A, a	Р р	*Р р*	R, r
Б б	*Б б*	B, b	С с	*С с*	S, s
В в	*В в*	V, v	Т т	*Т т*	T, t
Г г	*Г г*	G, g	У у	*У у*	U, u
Д д	*Д д*	D, d	Ф ф	*Ф ф*	F, f
Е е	*Е е*	Ye, ye; E, e*	Х х	*Х х*	Kh, kh
Ж ж	*Ж ж*	Zh, zh	Ц ц	*Ц ц*	Ts, ts
З з	*З з*	Z, z	Ч ч	*Ч ч*	Ch, ch
И и	*И и*	I, i	Ш ш	*Ш ш*	Sh, sh
Й й	*Й й*	Y, y	Щ щ	*Щ щ*	Shch, shch
К к	*К к*	K, k	Ъ ъ	*Ъ ъ*	"
Л л	*Л л*	L, l	Ы ы	*Ы ы*	Y, y
М м	*М м*	M, m	Ь ь	*Ь ь*	'
Н н	*Н н*	N, n	Э э	*Э э*	E, e
О о	*О о*	O, o	Ю ю	*Ю ю*	Yu, yu
П п	*П п*	P, p	Я я	*Я я*	Ya, ya

*ye initially, after vowels, and after ъ, ь; e elsewhere. When written as ë in Russian, transliterate as yë or ë. The use of diacritical marks is preferred, but such marks may be omitted when expediency dictates.

GREEK ALPHABET

Alpha	A	α	ϰ	Nu	N	ν	
Beta	B	β		Xi	Ξ	ξ	
Gamma	Γ	γ		Omicron	O	o	
Delta	Δ	δ		Pi	Π	π	
Epsilon	E	ε	ϵ	Rho	P	ρ	ϱ
Zeta	Z	ζ		Sigma	Σ	σ	ς
Eta	H	η		Tau	T	τ	
Theta	O	θ	ϑ	Upsilon	Υ	υ	
Iota	I	ι		Phi	Φ	φ	ϕ
Kappa	K	ϰ	κ	Chi	X	χ	
Lambda	Λ	λ		Psi	Ψ	ψ	
Mu	M	μ		Omega	Ω	ω	

RUSSIAN AND ENGLISH TRIGONOMETRIC FUNCTIONS

Russian	English
sin	sin
cos	cos
tg	tan
ctg	cot
sec	sec
cosec	csc
sh	sinh
ch	cosh
th	tanh
cth	coth
sch	sech
csch	csch
arc sin	$\sin^{-1}$
arc cos	$\cos^{-1}$
arc tg	$\tan^{-1}$
arc ctg	$\cot^{-1}$
arc sec	$\sec^{-1}$
arc cosec	$\csc^{-1}$
arc sh	$\sinh^{-1}$
arc ch	$\cosh^{-1}$
arc th	$\tanh^{-1}$
arc cth	$\coth^{-1}$
arc sch	sech^{-1}
arc csch	csch^{-1}
rot	curl
lg	log

GRAPHICS DISCLAIMER

All figures, graphics, tables, equations, etc. merged into this translation were extracted from the best quality copy available.

CERMET FRICTION MATERIAL

B. G. Arabey, I. I. Zverev, M. S. Zukher, S. S. Kokonin, Yu. M. Markov, A. T. Tumanov and V. A. Tyurin

The invention is related to the field of cermet friction materials which are used for braking gear, for example, aircraft brakes.

We know of a cermet friction material with the following composition, weight %:

Boron carbide	10-70
Boron nitride	1-5
Metals from the iron group, taken in any combination	5-50
Zirconium carbide	the remainder

The material has a high coefficient of friction and wear.

The purpose of the invention is to raise the thermal, tensile and flexural strength. This is achieved by introducing graphite fiber with the following relationship of components, weight %, into the proposed cermet friction material:

Boron carbide	10-50
Boron nitride	1-5
Metals from the iron group, taken in any combination	3-35
Graphite fiber	2-10
Zirconium carbide	the remainder

The thermal strength of this friction material with the introduction of 2-10 weight % of graphite fiber is 125-145 heating-cooling cycles when cooled from 1000 to 20°C in water. The introduction of graphite fiber in a quantity of less than 2 weight % only increases thermal strength insignificantly (from 30-35 heating-cooling cycles), while its introduction in a quantity of more than 10 weight % sharply reduces its mechanical properties, including thermal strength by 35-40 heating-cooling cycles.

This cermet friction material has the following properties:

Specific gravity, g/cm^3	4.8
Coefficient of friction at braking temperature of 600°	0.50-0.55
800°	0.45-0.50
Wear at specific braking energies, $kg\text{-}m/cm^2$ 450	2-6
923	6-11
Stability of coefficient of friction	0.77-0.88
Permissible volumetric operating temperature, °C	800
Thermal diffusivity, W/m·deg at 100°C	51.2
200°C	44.3
400°C	36.7
600°C	30.3
800°C	28.1
1000°C	26.5

Specific heat, cal/g·deg	
at 100°C	0.14
200°C	0.14
400°C	0.15
600°C	0.16
800°C	0.17
1000°C	0.19
Ultimate tensile stregnth, kg/mm^2 at 20°C	42-45
Transverse strength, kg/mm^2 at 20°C	70-74

The cermet friction material is obtained by the hot extrusion of a mixture of powders of the initial components in graphite metal dies. The mixture is prepared in a mixer for 30-40 min. with the simultaneous introduction of the graphite fiber in the form of plaits 25-30 mm long.

The hot extrusion of the article is conducted under the following conditions:

Extrusion temperature, °C	1800-1900
Unit extrusion pressure, kg/cm^2	250-350
Time of holding under pressure at extrusion temperature, min.	40-60

At the end of the hot extrusion process the articles are extracted from the graphite metal die and are mechanically worked if necessary.

Subject of Invention

A cermet friction material which contains zirconium carbide, boron carbide, boron nitride and metals from the iron taken in any combination which is distinguished by the fact that in order to raise thermal, tensile and flexural strength, graphite fiber is introduced into it in the following relationship of components,

weight %:

Boron carbide	10-70
Boron nitride	1-5
Metals from the iron group, taken in any combination	3-35
Graphite fiber	2-10
Zirconium carbide	the remainder